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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Bell et al. )  
SERIAL NO.: 10/008,628 )  
FILED: December 6, 2001 )  
TITLED: DISPERSANTS AND LUBRICATING OIL )  
COMPOSITIONS CONTAINING SAME )  
Examiner: E. McAvoy  
Art Unit: 1764

Atty. Docket No. 2001L006

Assistant Commissioner for Patents  
Washington, DC 20231

RESPONSE

Sir:

This paper is responsive to the Office Action mailed February 4, 2003. This application contains claims 1 through 23, as originally filed. Applicants offer no amendments to the claims.

The invention is directed to the discovery that a narrow class of dispersants that are the reaction product of a polyalkenyl-substituted mono- or dicarboxylic acid, anhydride or ester, and a polyamine, in the presence of boron in an amount such that the ratio of the wt. % of boron to the wt. % dispersant nitrogen (B/N) is within a narrow defined band, provide an unexpected improvement in lubricating oils. Specifically, it has been found that nitrogen-containing dispersants having a functionality within the limited range of greater than 1.3 to less than 1.7, in the presence of an amount of boron such that the B/N ratio is from about 0.05 to about 0.24, provide improved piston cleaning properties when used in internal combustion engine lubricating oil compositions.

Claims 1 through 23 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 through 24 of co-pending (and concurrently filed) Application No. 10/010,668. Applicants respectfully request that the "double patenting" rejection be held in abeyance until the scope of otherwise patentable subject matter is determined in each of the present application, and the noted co-pending application.

Claims 1 through 23 were rejected under 35 USC Section 103(a), for being unpatentable over U.S. Patent No. 4,234,435 to Meinhardt et al. (hereinafter "the Meinhardt et al. patent"). The Meinhardt et al. patent discloses generally materials that are the reaction product of a polyalkenyl-substituted mono- or dicarboxylic acid, anhydride or ester; and a polyamine, which materials may optionally be borated, and that such materials are useful as lubricating oil dispersants. The Meinhardt et al. patent describes broadly the functionality of the dispersants, requiring only that said functionality be at least 1.3. Similarly, the Meinhardt et al. patent only generally describes post-treatment of dispersants with boron and makes no mention of the amount of boron present, either in terms of absolute amount or relative to the amount of dispersant nitrogen. The Meinhardt et al. patent fails to suggest that dispersant compositions having simultaneously functionality within the limited range of greater than 1.3 to less than 1.7, and a B/N ratio of from about 0.05 to about 0.24, will provide any significant benefit over similar dispersant compositions outside the scope of the present claims.

The benefits of the presently claimed dispersants, compared directly to other dispersants within the broad class of materials disclosed by the Meinhardt et al. patent, are demonstrated by the comparative test results of the present specification, as summarized in Table 2 (page 35 of the present specification). As shown by the data of Table 2, particularly a comparison of Oils 1 to 4, raising the functionality of a dispersant (which one would do to achieve higher dispersant nitrogen content, and thus, increased sludge/varnish and soot control) results in a deterioration in the piston cleanliness result (indicated in terms of PC Merit G2 @ 36 hrs. and hrs. to PC<sub>av</sub> = 65).

A comparison between Oils 3 and 8, containing dispersants D3 and D8, respectively, clearly demonstrates the effect of the presence of an amount of boron providing the claimed B/N ratio on the piston cleanliness performance. Both dispersant D3 and D8 had identical functionalities of 1.4 (and molecular weight distributions (MWD) of 2.2). Oil 8, containing borated dispersant D8 representing the present invention, is shown to provide an improvement in piston cleanliness performance of about 66% compared to Oil 3. A comparison between Oil 8 and Oil 7 (containing dispersant D7, which was based on a dispersant identical to D8 that was borated to a greater boron content) demonstrates the criticality of the claimed upper limit on the B/N ratio. Specifically, D7 is borated to an extent raising the B/N ratio above the claimed range to 0.25. Oil 7 was shown to provide piston cleanliness performance inferior to that of both Oil 8 of the invention and boron-free Oil 3.

There is nothing in the Meinhardt et al. patent that would lead one of ordinary skill in the art to expect a relationship between dispersant functionality and piston cleanliness performance in a lubricating oil. There is nothing in the Meinhardt et al. patent that would lead one of ordinary skill in the art to expect that the presence of boron will have any effect on the piston cleanliness performance of the dispersant in lubricating oil. There is clearly nothing in the Meinhardt et al. patent that would lead one of ordinary skill in the art to expect a relationship between the amount of boron relative to dispersant nitrogen and piston cleanliness performance in lubricating oil. There is nothing in the Meinhardt et al. patent that would lead one of ordinary skill to select the present narrow class of claimed dispersants from the broader class, for any purpose. The unexpectedly improved performance provided by dispersants within the narrow selected class now claimed is clearly demonstrated by the test data of the specification. In view of this demonstration of unexpectedly improved results, applicants submit that the rejection presented under Section 103 in view of the Meinhardt et al. patent, should now be withdrawn.

Based upon the foregoing, applicants submit that the claims of this application distinguish over each of the cited prior art references. Therefore, applicants respectfully request that all rejections be withdrawn, and that the above-identified application now be passed to issue.

Respectfully submitted,



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